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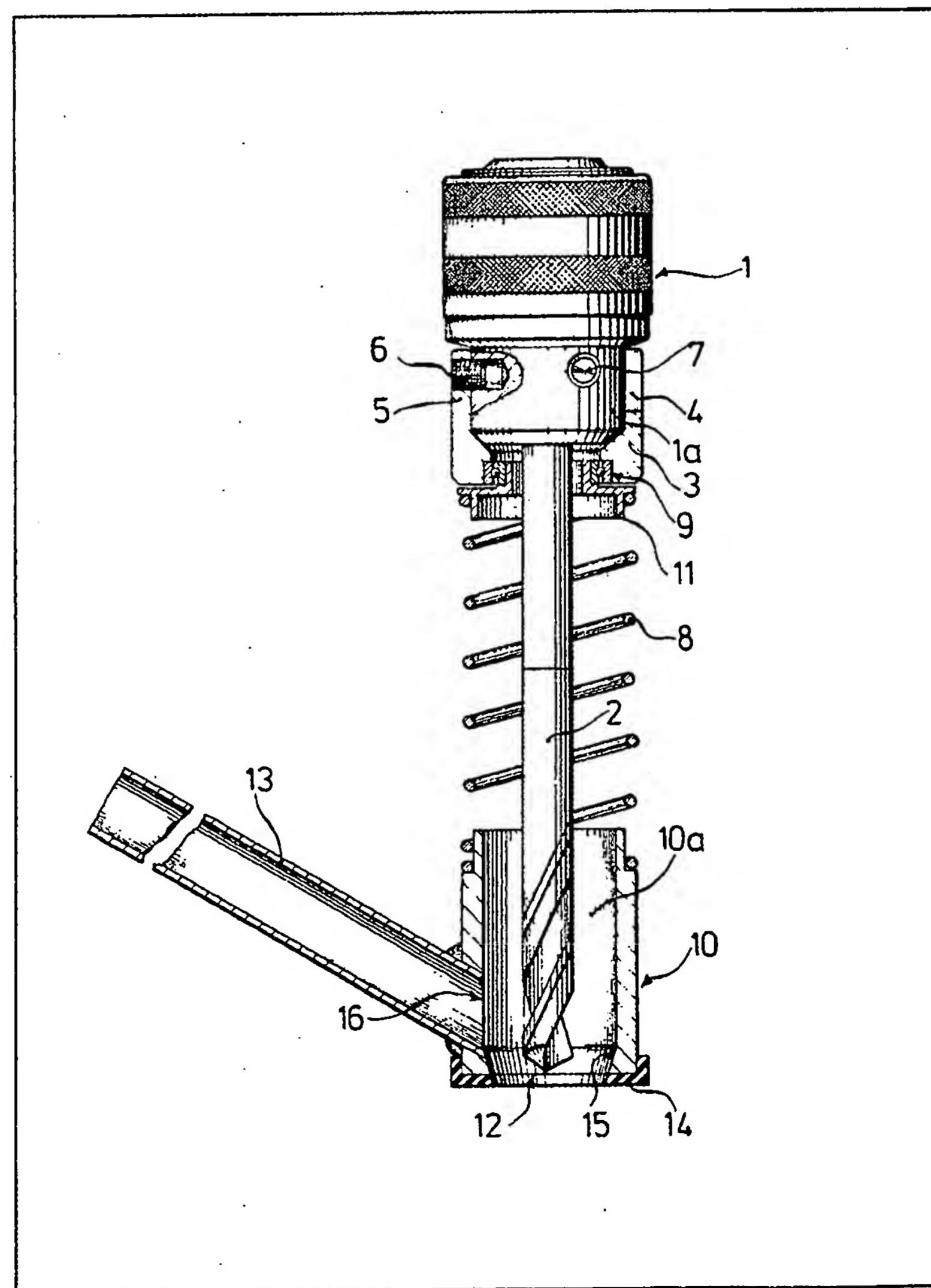
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(54) Apparatus for sucking away swarf
at the boring location of a boring tool

(57) Swarf or dust generated at the

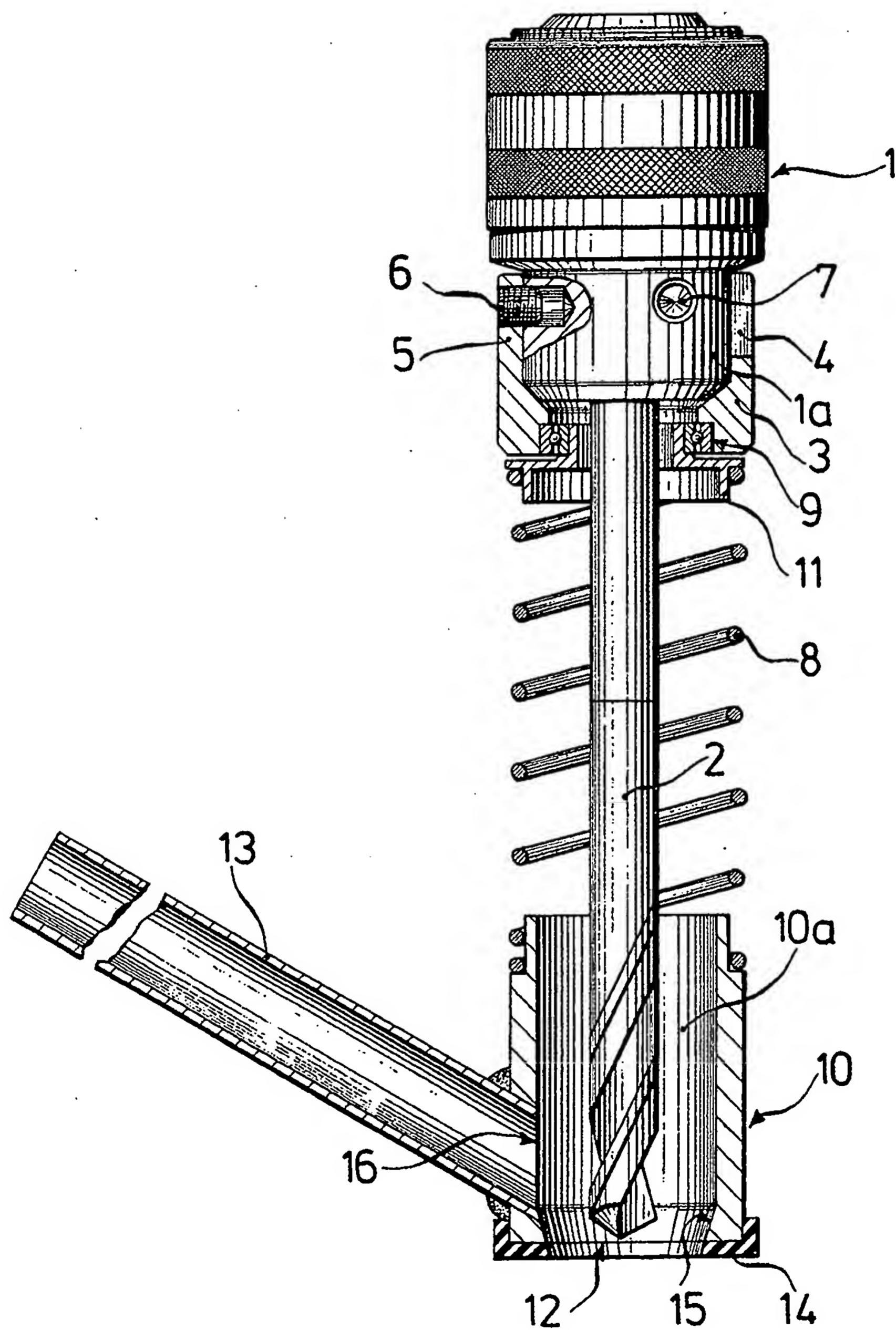
boring location of a drill 2 is sucked away through a mouth 12 of a suction member 10 and a connection 13, while the member 10 is located coaxially with a drill chuck 1 by a stressed compression spring 8 reacting on an annulus 11 on which a mounting ring 3, detachably fixed to the chuck 1 rotates. As the drilling proceeds the spring 8 is compressed and the suction action is enhanced by a tapered inside surface 15 of the suction member 10.



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SPECIFICATION

Apparatus for sucking away swarf at the boring location of a boring tool

- 5 The invention relates to an apparatus for sucking away swarf or boring dust at the boring location of a boring tool which is gripped in the boring chuck of a boring machine, comprising a suction member
- 10 through which the boring tool extends when in use and which is loaded axially by a spring reacting on the machine, the suction member having a suction mouth bearing against an area surrounding the boring location and the suction member also having
- 15 a connection for a suction pipe.
- Apparatus of this kind is used to suck away the swarf or boring dust which is produced when boring through a surface, thereby to prevent the area around the boring location being fouled by swarf or
- 20 boring dust. In a suction removal apparatus which is known from practical use, the suction member is mounted on rails which are guided parallel to the boring axis on the housing of the boring machine. As the boring operation progresses, the suction mem-
- 25 ber with the rails is pushed back against spring pressure and allows the boring tool to penetrate increasingly into the hole. Mounting the suction member on the rails and guiding them on the housing of the boring machine is expensive. In
- 30 particular, converting the machine is a complicated operation. Either the guide means for guiding the rails on the housing of the machine is an integrated component, in which case the suction member cannot be used on existing boring machines which
- 35 still do not have the guide means, or the guide means is an independent component which is to be mounted to the housing of the boring machine, in which case the arrangement suffers from the dis-advantage that the guide means frequently has to be
- 40 fitted to and removed from the housing of the boring machine.

The invention is based on the problem of so designing an apparatus of the above-indicated kind that the apparatus can be fitted and removed again without difficulty and quickly, while being of a simple design configuration.

According to the invention, this problem is solved by providing the boring chuck with a mounting ring rotatable with respect to the spring which is in the form of a helical spring coaxial with respect to the boring tool, and stressed axially between the suction member and boring machine. The mounting ring is preferably in the form of a clamping ring which can be fitted axially onto the clamping chuck and which has a locking screw which engages into a radial hole provided on the clamping chuck body for receiving a chuck key.

The advance which is achieved by the present invention is substantially that the apparatus according to the invention is not mounted on the housing of the boring machine but directly on the clamping chuck, namely on the chuck body, and that the suction member is joined to the mounting ring solely by means of the spring so that there are no further mounting and guide means such as rails, rail guide

arrangements or the like. The boring machine does not require any alterations or adaptation in order to be fitted with the apparatus according to the invention. Although the spring is held axially to the

- 70 mounting ring of the boring chuck, it does not participate in the rotary movement of the boring chuck and is therefore capable of pressing the suction member against the surface in which the hole is being bored, in the vicinity of the boring
- 75 location, as is required for picking up and sucking away the swarf or boring dust which comes out of the hole being bored.

In an advantageous embodiment, the suction member is formed as a sleeve with an internal space 80 which increases in size immediately inside the suction mouth. The suction mouth is therefore reduced in size, relative to the space inside the sleeve. In particular, it may be desirable for the increase in size of the space within the sleeve to be 85 of a tapered configuration. This results in a tapered inside surface converging towards the suction mouth, so that particles of boring dust which are transported out of the hole by the boring tool and which are flung by centrifugal force, due to the 90 rotation of the boring tool, against the tapered inside surface, are deflected and conveyed axially in the sleeve to the connection for the suction pipe.

Preferably, the connection for the suction pipe is formed as a tubular member which projects laterally 95 from the suction member and serves as a handle by which the suction member can be guided by hand in association with the spring. The connection for the suction pipe opens in the enlarged space within the suction member.

- 100 An example of the invention is described in greater detail hereinafter with reference to the accompanying drawing, which is an axial section through one embodiment of the invention.

The drawing does not show the boring machine.

105 The boring chuck is indicated by reference numeral 1 while a drill which is gripped in the boring chuck 1 is indicated by reference numeral 2. A mounting ring 3 is arranged on the boring chuck, more precisely on the chuck body 1a thereof. The ring 3 can be easily 110 and rapidly secured to and removed again from the boring chuck 1. For that purpose, the mounting ring 3 has a collar portion 5 which is formed as a clamp ring, by virtue of a longitudinal slot 4, and which carries at least one locking screw 6 which engages 115 into one of a number of radial holes 7 provided in the clamping chuck 1 for fitting the conventional chuck key. A helical spring 8 is mounted rotatably on the mounting ring 3 and is axially braced towards the boring machine, that is to say, upwardly in the drawing. For that purpose, the embodiment illustrated has a ball bearing assembly 9 although in principle the bearing assembly could also be formed as a plain bearing. Guided on the ball bearing assembly 9 is an annular member 11 to which the spring 8 is secured. The spring 8 is a coil spring which is disposed coaxially around the drill 2, but by virtue of the provision of the ball bearing assembly 9, the spring does not participate in the rotary movement of the clamping chuck 1 and is therefore connected directly to a suction member 10 by means

of the front end of the spring, that is to say, the bottom end as viewed in the drawing. The suction member 10 includes a suction mouth 12 which, under the force of the spring 8, bears against a 5 surface (not shown) in which the hole is to be bored, in the area around the boring location, and also a connection 13 for a suction pipe or hose (not shown). The spring 8 can be axially compressed towards the boring machine, whereby the suction member 10 10 can be pushed back axially towards the machine, with a reduction in the axial spacing therebetween. Normally, that is to say, in the unstressed condition of the spring 8, the suction mouth 12 of the suction member 10 extends at least to the tip of the drill 2. At 15 its edge, the suction mouth 12 includes a sealing ring 14, for example in the form of a rubber ring, which bears sealingly against the surface in which the hole is to be drilled, in the direct vicinity of the boring location, and thereby seals off the boring location in 20 an outward direction so that swarf or boring dust coming from the hole being bored pass into the suction member 10.

The suction member 10 is in the form of a sleeve, the space 10a within which is increased in size as it 25 extends from the suction mouth 12. The increase in size of the space 10a is of a tapered configuration, thereby producing a tapered inside surface 15 which converges towards the suction mouth 12. Swarf or boring dust which is transported out of the hole 30 being bored, by the drill 2, in the helical flutes thereof, are flung by the high-speed drill against the inside surface 15 and thereby conveyed axially further back, with the result that the boring dust or swarf passes into the mouth region 16 of the 35 connection 13 for the suction pipe and can there be readily picked up and carried away by the suction flow. The connection 13 for the suction pipe is in the form of a tubular portion which projects laterally from the suction member 10 and which opens into 40 the enlarged space 10a within the suction member 10. The suction member 10 can be comfortably handled by means of this portion 13.

CLAIMS

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1. Apparatus for sucking away swarf or boring dust at the boring location of a boring tool which is gripped in a boring chuck of a boring machine, comprising a suction member through which the 50 boring tool extends and which, when in use, is loaded axially by a spring reacting on the machine, the suction member having a suction mouth bearing against an area surrounding the boring location, and the suction member also having a connection for a 55 suction pipe, the boring chuck being provided with a mounting ring rotatable with respect to the spring which is in the form of a helical spring coaxial with respect to the boring tool and stressed axially between the suction member and boring machine 60 when the apparatus is in use.
2. Apparatus according to claim 1, in which the suction member is in the form of a sleeve with an internal space which is increased in size immediately inside the suction mouth.

65 3. Apparatus according to claim 2, in which the

enlarged portion of the space in the sleeve is of a tapered configuration converging towards the mouth.

4. Apparatus according to one of claims 1 to 3, in 70 which the connection for the suction pipe is formed as a tubular portion which projects laterally from the suction member and serves as a handle.
5. Apparatus according to claim 2, in which the connection for the suction pipe opens in the enlarged space within the suction member.
6. Apparatus according to any one of claims 1 to 5, in which the mounting ring is formed as a clamping ring fitted axially onto the clamping chuck and having a locking screw which engages into a 80 radial hole provided on the clamping chuck body for receiving a chuck key.
7. Apparatus substantially as hereinbefore described with reference to the accompanying drawing.

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